

SITUATING CINEMATIC SPACE WITHIN AN ACOUSTEMOLOGICAL  
FRAMEWORK:

TRANSMISSIONS FROM THE TECHNOLOGICAL SUBLIME

AN AUDIO-VISUAL EXHIBITION BY MICHAEL TROMMER

A thesis exhibition presented to OCAD University in partial fulfillment of the  
requirements for the degree of Master of Fine Arts in Interdisciplinary Art, Media  
and Design.

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## ABSTRACT

### SITUATING CINEMATIC SPACE WITHIN AN ACOUSTEMOLOGICAL FRAMEWORK: TRANSMISSIONS FROM THE TECHNOLOGICAL SUBLIME

MFA Thesis, 2015

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Field Recording.

My thesis project explores how cinematic space can be articulated within an acoustemological framework. Re-situating cinema within a sonic – rather than a visual – ontology affords a capacity for privileging sensory and sensual forms of mediation that have been for the most part subsumed by the dominance of the image. *Transmissions from the Technological Sublime* is an audio-visual work comprising seven audio channels (comprising six regular speakers arranged in a hexagonal array and one subwoofer) as well as a durational, large-scale, 3D animated video projection employing an extra-wide aspect ratio of 16:3.

This project draws upon an expanded notion of sound as a medium that is not only vibratory but also anamnetic, encompassing the immaterial as well as the tactile and manifesting itself as topological, temporal and subjective. It also approaches the idea of space as a site that embraces the cognitive and cultural, and that can thus be similarly apprehended as both imaginary and substantive. Building upon a broadened approach to field-recording as a central research methodology and deploying the affective and tactile capacities of sound to bring a fictional, animated environment to life, the project seeks to engender an awareness of space that is vibratory, textural and evolving, rather than merely perspectival or fixed.

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## INTRODUCTION

The genealogy of this project extends over a broad period in my personal history and artistic experience. Although primarily rooted in a continuously evolving twenty-five year practice as a field-recordist, the outcome has been informed by my work in live audio-visual performance, painting, video and photography. Additionally, while I do not necessarily see myself as a proponent of 'walking art', the project also bears the imprint of the exploratory and contemplative act of walking on my understanding of the construction of our lived reality. A common thread running through these seemingly vast interests has been a fascination with the evocations of the sublime – both natural and technological – in today's heavily territorialized and mediated landscapes. This project provides an outlet for reworking my fascinations with the sonic, the cinematic, and the sublime through an animated, multi-channel video installation that experiments with evocations of acoustic and pictorial space.

*Transmissions from the Technological Sublime* is a 37-minute looping animation featuring an unseen protagonist encased in a generic black sedan. The animation technique is minimal: all images are reductive representations of manufactured goods and industrial objects. The spaces, that is, the natural and artificial environments that frame the protagonist's elliptical quest, come alive mostly via audio; pared down visuals employ an exaggerated landscape aspect ratio of 16:3 to encourage the viewer to scan the image, rather

than focus on one specific area of visual activity. The story unfolds in a perpetual penumbra in order to focus attention on the sonic, which is disseminated via six-channel surround sound augmented by a centrally-placed subwoofer.

For conceptual clarity, I have chosen to trace the development of this project according to its genealogical evolution. I will first provide an account of my apprehension of the sonic – one of the major components of the project – and move on to discuss how my recording methodologies evolved thereof. Next, I will address how an acoustemological evaluation of the sonic material determined the visual elements of the final piece, especially its contextualization within the trope of the technological sublime – a state of combined awe and bewilderment vis-a-vis the artificial environment in which we conduct our lives. Finally, I will describe the sound-processing and animation techniques employed in order to communicate my subjective response to the contemporary lived environment. I hope to demonstrate that the adoption of a sound-centred approach to cinema – and cinematic space, specifically – offers a capacity for sensual mediation, which has, for the most part, been under-explored.

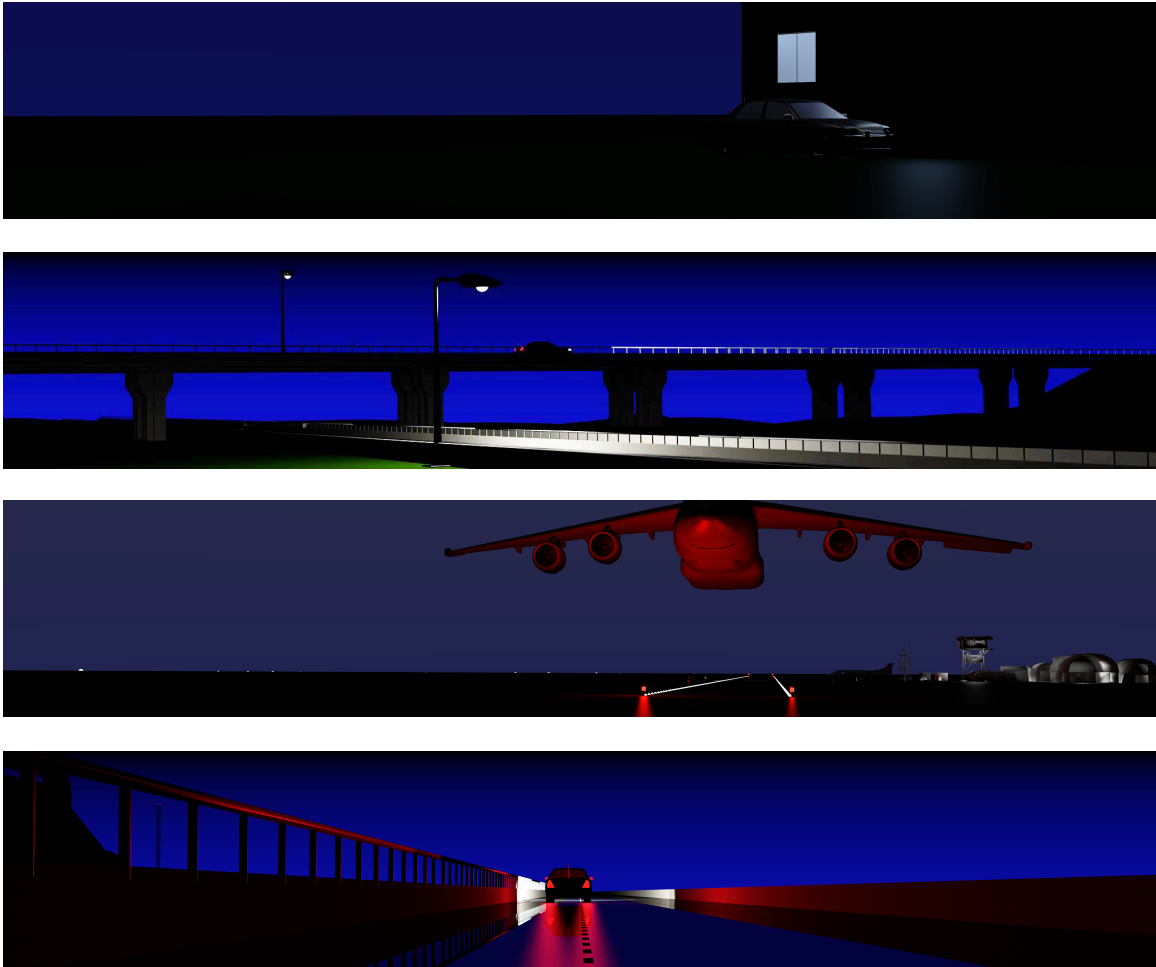


FIG 1: *Transmissions from the Technological Sublime*: animation stills

## **1. TOWARDS AN EXPANDED ONTOLOGY OF SOUND**

Most of us hear sound; audition is one of the first of the senses to become active and it is continuous since the ears, unlike the eyes, cannot be shut. The fact that our auditory senses are always ‘on’, coupled with the proliferating density of our acoustic environment has had the effect of making our listening more selective (Schafer 1993, Krause 2002), which is a phenomenon Salomé Voegelin describes as “quasi-deliberate unhearing” (*Sonic Possible Worlds* 159). As a result, there exists an excess or surplus of information which is often overlooked, as opposed to overheard. In my own practice, I have come to see the act of *listening to* rather than simply *hearing* our sonic environment as deeply revelatory and political; truths about the structures and systems within which we conduct our daily lives become exposed via a considered appraisal of our soundscape. As acoustemologist Steven Feld points out, “sonic presence and awareness [are] potent shaping forces in how people make sense of experience,” presenting a wealth of information (Feld 97).

My awareness of sound’s potential in revealing hidden structures dates back to my childhood experience with trains. At the risk of running on a personal tangent, I’ll recount an anecdote, only to use it as an entry point to discuss specific strategies that inform my approach to sound within the context of the thesis project presented here.

Behind my house was a forest, which included a path system (the Rideau Trail) that led through various wetlands and finally to a rail line at the town limits. A great deal of my time was spent wandering these woods, with a visit to the distant rail line often providing a particularly thrilling culmination to these treks. There was no guarantee that a train would actually pass; however, the experience would generally begin with an anticipative wait, ears placed against the steel of the track – hot or cold, depending on the season – and listening/feeling for the telltale vibration that would herald the eventual appearance of a rumbling behemoth. A few minutes after humming metal announced the approach of a train, a muted bass drone would emerge, slowly suffusing the sonic environment as the long infrasonic waves would begin to overwhelm and mute the mid to high range frequencies. Occasionally, depending on the weather conditions, this bass drone could be accompanied by a rhythmic pin-prick chiming of the train's bell as it passed the various level crossings along its trajectory to where I awaited. After several minutes, the locomotive would finally come into view and an electrifying crescendo would begin: an expanding, broadband din climaxing in an ear-shattering, ground-shaking, doppler roar of sound compressing then decompressing as several tonnes of diesel-powered iron rushed past. After the locomotive, a drop in amplitude, a modulated mantra punctuated by the rhythmic clank of the passing wagons would become the dominant sound: an evocative, loping rhythm, the echoes of which I would subsequently come to recognize in a range of musics, from the blues to the

avant-garde. In the instance of a passenger train, I recall being fascinated by the sonic divide that would exist between my position as an external observer and that of the people onboard (an environment I was quite familiar with as my family would travel by train regularly); here were worlds that were physically adjoined in a spatial sense, yet sonically and experientially vastly disjointed. After the final car had gone by, there would be a sudden, almost shocking drop back into the 'regular' soundscape; the stridulation of crickets, chirping of birds and white-noise hiss of wind through branches that had moments ago been sonically obliterated by the aural phenomenon of the onrushing train would resurface, now seeming muted and hushed. Finally, the sonic afterglow: the distinctive, lonesome tritone call of the horn would sound out, reverberating through the landscape, sharp or muted depending on the atmospheric conditions of the day, a memento of what I had just experienced as well as a sonic conjuration of departures, arrivals and vast distances that lay beyond.

This anecdote draws attention to the multi-layered complexity of a simple, quotidian sonic event. Listening to – rather than simply hearing (Jordan 2012; Schafer, Feld et al) – the passing train had the capacity to:

1. evoke the unseen
2. stimulate memory
3. demonstrate the physics of sonic propagation

4. paradoxically conjure both a sense of physical space and a subjective displacement within this same space
5. elicit cognitive and emotive associations, which are both subjective and communal, and
6. convey a vividly sensual and electrifying *embodied* experience.

Such observations later on became the basis of my work, culminating in my desire to pursue the project outlined in this thesis.

Drawing from the personal observations stated above as well as established professional practice, my thesis project aims to apply these intrinsic capacities of sound to impart a sensual depth and amplitude to the cinematic event (especially revolving around evocations of space) that can perhaps not be achieved via a predominantly image-centred approach. In addition, I would like to gesture towards an expanded ontology of sound, one that acknowledges a wide continuum in both the physical and affective attributes of the medium.

## 1.1 DEFINING THE SONIC AND SPATIAL CONTINUUM

As my recent research and studio practice focus primarily on the deployment and propagation of sound within space, the articulation towards an expanded ontology of sound (and consequently space itself) warrants a clarification of exactly what is to be understood by these terms. Firstly, 'sound', in terms of physics, is generally regarded as energy that travels as a vibrational vector



through a medium (Demers 2010). Accordingly, sound carries with it information about both its point of origin as well as its trajectories. Given the apprehension of sound as vibration, scholars such as Douglas Kahn and Shelley Trower have called for an expanded consideration of the sonic/vibratory spectrum, one which acknowledges its significant substantiation beyond simple audible frequency. Their approaches take into account the physical as well as the metaphysical and social dimensions: Kahn has written extensively on electromagnetic energy as a sonic phenomenon (Kahn 2013), broadening our understanding of what constitutes sound, while Trower discusses the sonic spectrum's extension into the frequency range of visible light (Trower 2012). Henri Lefebvre (2004), Steven Goodman (2009) and Salomé Voegelin (2010) venture even further, pushing for an ontology of sound that incorporates not only the social, but also the political and philosophical. Lastly, it is also useful to consider sonic affect – even as ‘non-sound’ or in the form of sound playing in one’s head – as an important factor in formulating an expanded ontology for sound and space. Accordingly, sound often functions as mnemonic refrains, as in the case of earworms and the phenomenon that Jean-François Augoyard describes as ‘anamnesis’: “An effect of reminiscence in which a past situation or atmosphere is brought back to the listener’s consciousness, provoked by a particular signal or sonic context....[it] is the often involuntary revival of memory caused by listening and the evocative power of sounds” (21). Although anamnestic sounds are not ‘transmitted’ or ‘produced’ in the conventional sense, they are nonetheless experienced

affectively as sonic matter and comprise an integral facet of the acoustic environment.

Sound, whether understood within a vibration-oriented or mnemonic framework, is intrinsically connected to a sense of space, in which the existence of a transmitter, a medium and a receiver (and thus the existence of a spacio-temporal gap) is implicit. As Denis Smalley argues, sounds are “space-bearers” that “carry their space with them” and “produce space” (38), interacting with and acting as a connector among its contents and constituents. Audible vibration can be experienced across significant distances (particularly when mobile, such as in the case of sirens or airplanes), with the source signal often bearing the imprint of intervening spatial characteristics. The density and material composition of reflective and refractive surfaces, atmospheric conditions, and intermediate sonic emissions all have an impact on a signal’s distortion on its journey between emitter to receiver. In addition to the influence of the physical environment on the transmission of vibrational vectors, there also exists a more abstracted apprehension of territory. The Lefebvrian formulation of space – as a site that embraces the mental and cultural, and which can correspondingly be considered to be both imaginary and real (Lefebvre 1991) – is also relevant to an understanding of sound’s space-bearing capacities and, furthermore, is integral to his theory of ‘rhythmanalysis’, which is referenced later in this paper. To summarize, then, a ‘space’ entails a complex set of personal, interpersonal, ecological or political relationships (Castells 2000) as well as both man-made and

natural factors that can generate or effect sound. Correspondingly, my thesis project considers sound and space as topological, temporal and subjective, articulating these qualities in order to synthesize and define a textured, pan-sensual and cinematic sense of place.

## **2. ACOUSTEMOLOGY AS A THEORETICAL FRAMEWORK: Field Recording and the Exploration of Acoustic Territories**

Acoustemology is an auditive cognitive theory/theory of knowledge or theory of what and how we experience through sound, through listening and other auditive practices – currently and historically, collectively and with respect to the individual human being, as well as in constant interaction with our other senses.

- Korgh M. Longstrup: *Hear (H)ere: An Acoustemological Manifesto*, 1

*Transmissions from the Technological Sublime* evolved via an acoustemological approach to the soundscape – an analysis of how sound and modes of listening exist as representations and manifestations of a specific time and space.

Acoustemology is a field that appeared in the early 1990s through the work of key proponents such as scholars Steven Feld, Mark M. Smith and Richard Cullen Rath, who sought to establish sonic ethnography as a key method of assessing the characteristics of lived environments. In keeping with acoustemology's emphasis on the interrelation of the senses, the observations gathered via the assessment of sonic material would eventually influence the manner in which the visuals would depict the project's narrative space.

To this end, the practice of field recording, enacted with a view to gathering acoustemological data about the contemporary urban and ex-urban environment, constitutes a key research technique in the realization of the sonic component of this project, while also informing the approach to the visuals. It is a praxis that fosters a strong awareness of how sound is defined by and is definitive of space, climate, geography, as well as human and other biological activity, in other

words, what acoustic ecologist Bernie Krause terms 'geophony', 'biophony' and 'anthrophony' (Krause 2002). As such, field recording explores the aesthetics and topography of both the natural and unnatural world via the acquisition and appraisal of ethnographic, phenomenological, narrative and qualitative sonic information. Implicit in this is a capacity for documenting the territorialization of sonic space and uncovering the power mechanisms that impose control over our contemporary acoustic environment. Although I am not broaching the field of acoustic ecology in a direct fashion within the remit of this project, I will nonetheless argue that the present-day soundscape – that of the technological sublime, that is, that which is imposed by overwhelming, techno-industrial structures that are a source of both fascination and dread in the contemporary urban imagination – is one that has become dominated by institutional deployments of vibrational force.

My field recording technique has been influenced by a variety of theoretical frameworks, most notably the work currently carried out at Harvard's 'Sensory Ethnography Lab' (SEL), which promotes development of creative production and ethnographic research that engages with the world in ways that are "constitutively visual or acoustic — conducted through audiovisual media". By doing so, it "encourages attention to the many dimensions of the world...that may only with difficulty, if it all, be rendered with propositional prose" (source: <http://sel.fas.harvard.edu/>). It also bears the imprint of the Situationist notion of the 'dérive', the subconsciously-directed, perambulating drift conducted in search

of revelatory aesthetic experiences within the urban topography. Finally, my practice has also been guided by Salomé Voegelin's call for a subjectively mediated field recording aesthetic which "celebrates [the] *presence* rather than absence [of the invisible figure with a microphone]" (*Collateral Damage* – italics mine), in other words, a practice that goes *against* erasing the subjectivity and traces of the recording artist in the name of a purely observational aesthetic. Harvard's SEL and Voegelin both vouch for articulating a transformative approach to the practice in which the emotional component of the recorder's presence in a particular time and place is allowed to be manifested. Such a methodology essentially acknowledges that the transparency of the recordist is an impossibility, seeing the collected sonic material as "leav[ing] the trace of an inhabited possibility, rather than produc[ing] the reportage of an assumed actuality" (Voegelin, *Collateral Damage*). Voegelin places such an approach in opposition to a purely taxonomic one, adding that it requires a consideration of the reality of recording media and technique, the recorder's position and responsiveness within the landscape, as well as the topography of the mediatic environment as integral elements in the sonic exchange: one which "embraces interpretation as part of the actuality of the real" (Voegelin, *Collateral Damage*).

## 2.1 TECHNICAL APPROACH AND PROCESSES

My technical approach to the recording of sounds seeks to acknowledge both the subjective agency of the field-recordist within the soundscape as well as a broadened concept of sonic matter via the use of an expanded selection of recording tools. These tools have been employed in conjunction with various experimental techniques with a view to accessing an extended range of the spectra of both audible and inaudible vibration that permeates and defines our environment – to enable a form of augmented listening, in other words.

My field-recording practice involves three distinct processes:

1. **Recording**, or the gathering of sonic material, which can be enacted both as an improvisatory and embodied act (as in the form of the ‘sound walk’) as well as a directed, intentional event (in multiple durational recordings of specific areas such as Toronto’s Port Lands, PATH system and urban waterfront, for example).

2. The **analysis** of the recorded material, which employs and attempts to reconcile two central strategies:

- A) An investigation of a ‘real’ time-space as captured through a diverse range of microphones and techniques: this is accomplished via the use of spectrograms and comparative listening. Spectrograms visually reveal frequency-based and temporal characteristics of sounds that are not always apparent upon audition. In particular, they expose ultra and infrasonic information, that is, sonic information

that lies beyond the range of audibility. Comparative listening, on the other hand, involves the correlation of recordings that are either temporally or spatially contiguous; this is done in order to identify specific acoustic differences or shifts that result from spatial or temporal displacement.

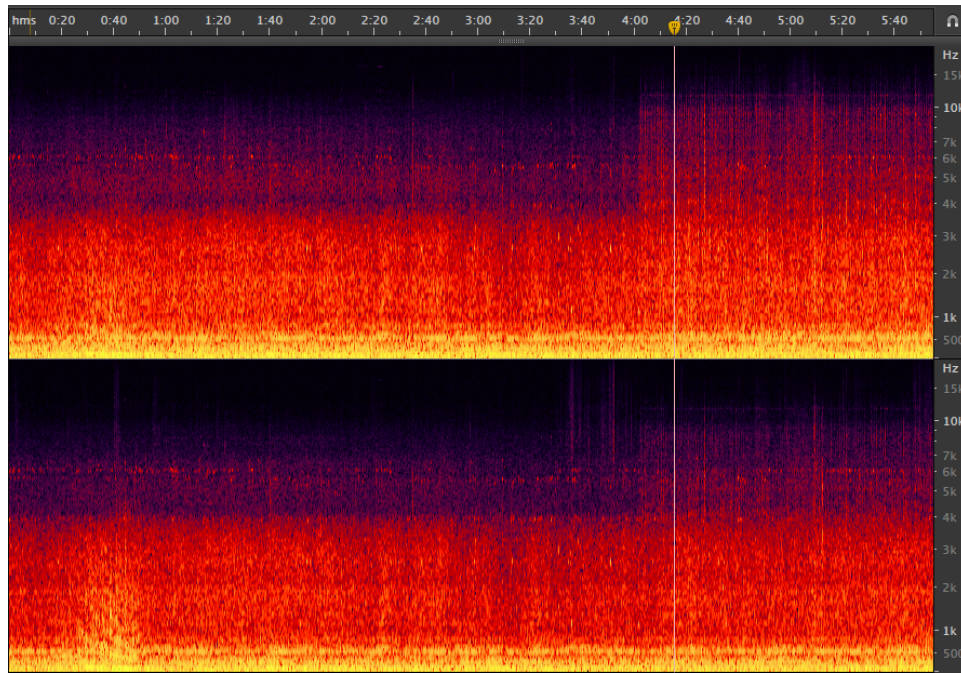


FIG 2: An example of a spectrogram: time is represented along the x-axis and frequency is represented along the y-axis. Colour represents amplitude: yellow areas are louder, black areas are quieter.

B) A move from a strictly taxonomic approach towards one that acknowledges the subjective mediation of sensory experience. This is necessitated by the fact that field recordings function mnemonically, much like the way that a photograph might, eliciting specific memories and associations that guide the manner in which the sound files will later be processed.



3. The **processing** of sound files – creative manipulation via spectral processing and other techniques with the goal of discovering subjective resonances within the recorded material and situating it within the remit of a particular context, in this case, that of the technological sublime.

The aforementioned negotiation of both the analytical and the subjective perspectives can be seen as fundamental to a sonic representation of the sublime: the highlighting of an aestheticized, subjective experience within a broader externalized macrocosm. The following section describes how such a recombinant approach informed the specific field recording techniques and technologies that were deployed for the gathering of sound material, while also outlining the theoretical frameworks that informed the practice. These descriptions are accompanied by a delineation of the analytical processes applied to recorded sounds, with a focus on identifying and isolating those specific frequencies that resonate within the sonic spectrum of the technological sublime.

#### 2.1.1 MICROPHONES

As I mentioned, a recombinant aesthetic juxtaposing the subjective and the external acoustic experiences informed my field recording practice, including the selection of technologies like microphones. A variety of positioning techniques and microphone types were used in the project in order to acquire, emphasize and analyze specific acoustic phenomena that characterize our lived and heard

environment. Here, a brief analysis of the microphone types and their application might be helpful:

### **Conventional Microphone Techniques and the Urban Dérive:**

**‘Conventional’ microphones**, as opposed to the specialized microphone types discussed later, capture sound transmitted through the medium of air, that is, sound as it is ‘normally’ received through the ears. Among these, **binaural microphones** replicate the acoustic effects the body has on the reception of sound. Recordings made with the binaural method usually create a three-dimensional effect of the sounds happening ‘in one’s head’, that is, the sensation of sounds occurring behind, above, below as well as ahead of the listener. As such, binaural recording is an effective method of replicating the nuanced sensation of actually being in a specific space. Furthermore, binaural microphones, which are usually worn in the ears, allow for a freedom of movement that facilitates the recording of kinetic soundscapes. Finally, their unobtrusive nature also eases the collection of sounds in which the obvious use of a microphone would attract undesired attention.

Within the context of this project, binaural microphones were extensively used for the documentation of long walks – transitions through acoustic space – for the purpose of examining the sonic conditioning of the urban environment. This approach sought to identify and capture what Brandon Labelle defines as ‘acoustic territories’ (Labelle 2010). Labelle states that acoustic territories are

determined by:

The seemingly innocent trajectory of sound as it moves from its source and toward a listener, without forgetting all the surfaces, bodies, and other sounds it brushes against...[it] is a story imparting a great deal of information fully charged with geographic, social, psychological, and emotional energy...My feeling is that an entire history and culture can be found within a single sound; from its source to its destination remaining specifically tied to a given context, as a deeper expressive and prolonged figure of culture (2010, xvi).

Sound walks were conducted as a responsive, improvised activity, following the sonic contours of the urban environment in a manner which sought to expose a narrative between contiguous spaces while assessing how sonic territories reflect and condition the physiological, the psychic, the social and the political, as discussed by Brandon Labelle (2010), Julian Henriques (2011) and Steve Goodman (2009). In essence, this approach resonates with the Situationist concept of the *dérive* – “a technique of rapid passage through varied ambiances” in which the subjects “let themselves be drawn by the attractions of the terrain and the encounters they find there” (Debord 62). It is a sensorial ethnographic practice that is specifically urban in nature, lending itself to the discovery of a city’s “psychogeographical contours” (Debord 62). Binaural sound walks were time-stamped and conducted in conjunction with the use of the android locational app ‘LD Log’. This allowed recorded trajectories to subsequently be analyzed in order to identify relevant correlations in terms of physical and acoustic space. Additionally, the app facilitated the textual, photographic, and video annotations that would later strongly inform the visual aspects of the piece.

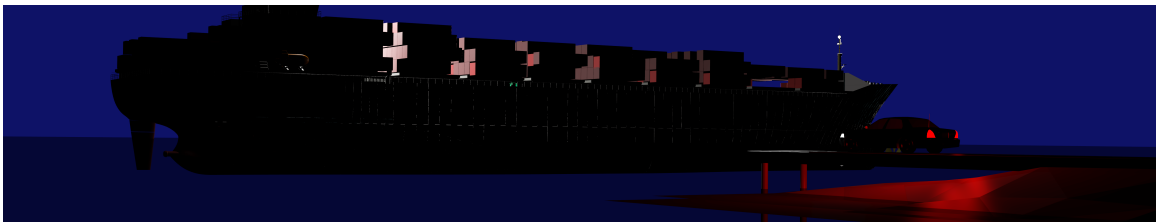
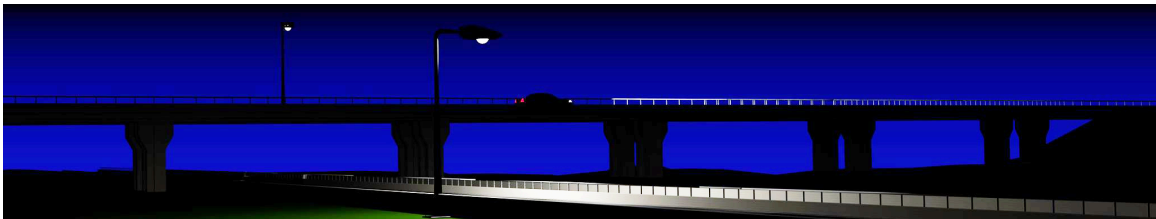


FIG 3: Photo documentation of recording locations and corresponding animation stills.  
Photos taken via the 'LD Log' app.

In addition to binaural microphones, the project made use of various types of **stereo and multi-channel microphone arrays**. These were mostly applied during the repeated recorded sessions that focused on 'habitual axes' such as Toronto's Port Lands, urban waterfront areas and PATH network. I borrow the phrase "habitual axes" here from Guy Debord's formulation of the *dérive*, which acknowledges that the "psychogeographical attractions discovered by *dérivers*

may tend to fixate them around new habitual axes, to which they will constantly be drawn back” (Debord 63). The stereo and multi-channel microphone arrays were deployed for two main purposes:

1) To record spatial information

Widely-spaced arrays, which involve placing a matched pair or series of microphones up to 50m apart, serve to accentuate spatially-derived sonic characteristics and are particularly effective in environments with highly reflective or diffuse acoustics. To this effect, the large microphone arrays were used to capture the dissemination of sound over extended distances in order to apprehend the acoustic effects of the intervening space on the propagated sound. The use of such techniques highlights the concept that received sound contains information about both its origin and its trajectory, accentuating sound’s capacity to extend beyond a strictly embodied zone of reference into a wider sensory horizon. As Joanna Demers states in *Listening Through the Noise*, “Sound is a vector. It emits from one location and travels to many other locations, and our perception of it depends on our own location in relation to both the sound and our other surroundings.” (114). Liminal areas on the periphery of the urban network, urban shorelines, and disused industrial sites (such as Toronto’s Port Lands) proved to be sonically interesting not only in this regard, but also for the fact that they represented areas of transition between natural and manufactured land/soundscapes. As such, they provided a provocative balance of anthrophony,

biophony, and geophony in addition to a rich mixture of acoustic spatial information.

Furthermore, recordings made in these areas usually captured sonic emanations the source of which was unseen and unknown, evoking ‘acousmatic’ sound (Schaeffer 91). In the writings of acoustic ecologists such as R Murray Schafer, the ability to sonically evoke that which is unseen was a key component in allowing sound to operate as the dominant sense, in many cases for reasons of survival, during humankind’s pre-textual era (Schafer 11). According to Schafer, hearing also had sensory privilege, “as a way of touching at a distance” (11), with touch valued as “the most personal of the senses”. For some, this unseen, disembodied yet affective aspect of sound bears a metaphysical resonance that has in many cases been compared to a haunting. In *Sinister Resonance*, David Toop describes acousmatic manifestations of sound as:

A haunting, a ghost, a presence whose location in space is ambiguous and whose existence in time is transitory...a phenomenal presence both in the head, at its point of source and all around – so never entirely distinct from auditory hallucinations. The close listener is like a medium who draws out substance from that which is not entirely there (xv).

These spectral properties of sound have had a fundamental influence on the animated component of my final project. More specifically, they informed my decision to work within a reductive visual framework, one in which the sonic is left to articulate that which lies within and beyond the images’ obscured, panoramic horizons. Additionally, the appraisal of the sonic characteristics of the ‘habitual axes’, particularly the recognition of the omnipresence and impact of vast, linear

infrastructural networks on the soundscape, eventually became a key factor in my decision to focus on the acoustemology of the 'technological sublime' for my final piece.

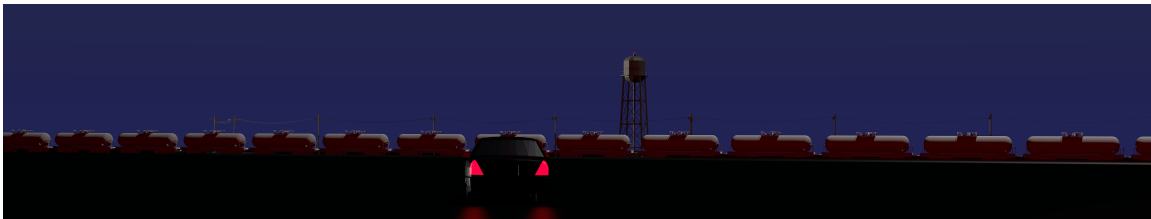


FIG 4: *Transmissions from the Technological Sublime*, Animation still

## 2) To provide durational recordings

In contrast to binaural microphones, multi-channel microphone arrays were virtually always used in static configurations. Though generally capable of obtaining recordings of a very high fidelity, their large size and complexity meant that they were time-consuming to install. Consequently, once set up, they were often left to record for extended periods of time. Though less convenient in some respects, this technique did lend itself well to an analysis of temporal shifts in a specific area's soundscape. Having a temporally wide-spanning compilation of recurrent and durational recordings allowed room for a Lefebvrian 'rhythmanalytic' assessment of the locations' acoustemology – a study of their transformation as presences through time, identifying the rhythms of specific spaces while also considering the effects of these rhythms on the inhabitants of those spaces. Although these temporal shifts in the soundscape could furnish

material for a thesis project on their own, I would like to briefly draw attention to the potency of some of the sonic data stored in these compiled recordings for a rhythm-based inquiry. There is a breadth of information contained therein, the apprehension of which unveils temporal, spatial, social and, ultimately, political facets of our lived environment – fundamental frequencies bearing the marked resonance of the mechanisms of the technological sublime:

As temperature and atmospheric conditions have a clearly detectable effect on the propagation of sound waves, notable differences are observable based on nested cycles of **season** and weather. The filtering and dispersive effects of humidity are particularly apparent on outdoor recordings, as is the sound-absorbent nature of snow. The rustling of leaves – silkier in the spring and early summer, while becoming dry and brittle in the autumn, and, finally non-existent in the winter – as well as the transition in the quantity and nature of animal sounds (the honking of migrating geese in summer and early winter, for example) are further examples of telltale indications of season. Similarly, the **diurnal cycle** has a pronounced effect on the biophony and is clearly made evident in the anthrophony – the crescendo of commuter traffic sounds during morning and evening rush hours being one example among many. The **weekly cycle** also affects the soundscape. To illustrate, recordings made on weekends tend to feature the sound of children more prominently whereas those made on Sundays generally have a quieter overall ambient sound level than those made in identical



locations during workdays. Finally, there is the audible evidence of long-term rhythmic **cycles of economic activity** and their reciprocal impact on the urban soundscape – the increase in the grinding, humming and beeping sounds of construction equipment in the downtown core, the shift from a more biophonically biased soundscape to an anthrophonically-dominated one in areas now known as Cityplace and Liberty Village – all belie the growth of Toronto as a major urban and economic centre.

Such a comparative, acoustemological analysis of recorded material reveals that the sonic traces of economic activity, in fact, form one of the most important markers of the quotidian soundscape. In *The Soundscape and the Tuning of the World*, R Murray Schafer argues that such elements of an economic origin are the predominant factor in determining what cities sound like – manifestations of both an aural and a financial territorialization. The impact of socio-economic factors upon the rhythms and frequencies of the acoustic environment was particularly apparent in sounds sourced from the PATH network. The area proved consistently dynamic and animated during workdays, echoing with the sounds of muted, cordial conversations (virtually all in English), the tapping footsteps of office shoes on marble floors – which would become quicker and more hurried during the evening commute – as well as the beeping of tills and the muffled huffing of espresso machines. These keynote sounds underscore the fact that the area exists as a site of socio-economic privilege. Evenings, nighttime,

weekends and holidays (when the network is virtually deserted), however, sonically expose the extensive and pervasive infrastructural networks that power the contemporary cathedrals that loom invisibly overhead. The ambient drone of climate control and circulation systems, humming, whirring ATMs, the subdued chatter of television screens flickering in empty hallways and food courts – perpetually ‘on’, though audible only when purged of the presence of its end-users – provide a constant, linear, technologized rhythm functioning within a periodic, cyclical human cadence.

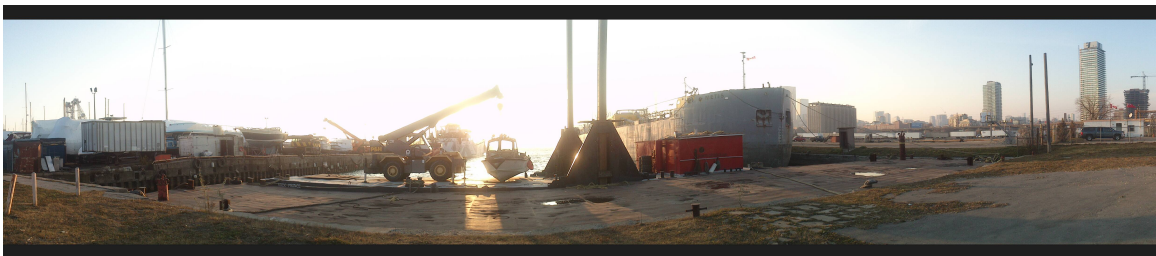
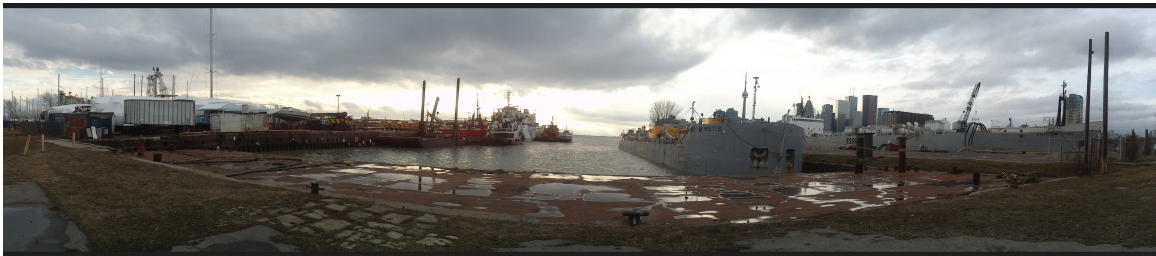


FIG 5: A 'Habitual Axis' – Toronto's Port Lands  
Images captured via the 'LD Log' locational app.



FIG 6: ORTF Microphone array, First Canadian Place underground parking garage  
Image captured via 'LD Log' locational app.



FIG 7: Wide microphone array, Western Channel.  
Image captured via 'LD Log' locational app.

**Extended microphone placement techniques** were used in order to accentuate the acoustic effects of distinctive natural and man-made features within specific locations. Small lavalier microphones were inserted into cavities such as bottles, venting systems, sewer grates and other apertures, thereby permitting the examination of the resonant characteristics and effects of what would normally be inaccessible spaces – the microphone acting as an extension of the ear. It is important to note that the decision was made to solely incorporate features that were on location, with as little displacement or re-positioning as practically possible (i.e. if microphones were placed in bottles, these had to be found in situ). The acquisition of a large number of inexpensive, though decent-sounding and robust lavalier microphones also encouraged a liberal amount of risk-taking and experimentation to this end. The approach sought to acknowledge and accentuate the relevance and impact of the material environment on sound dissemination, with a particular focus on exploring the effect artificial elements have upon acoustic propagation.

**Hydrophones** are designed to be used underwater, but can also be immersed in other substances such as snow, ice, earth, sand, etc. They serve as a supplement to the extended placement techniques outlined above, with the added benefit of enabling access to listening positions within a variety of materials. Hydrophones were used extensively along urban shorelines, uncovering a generally unseen and unheard environment that is surprisingly

dense with anthropic noise. The grinding chatter of ship motors as well as the white-noise whirl of cooling pumps and other infrastructural apparatus (whose identity remains unknown – another instance of acousmatic sound) dominate the underwater soundscape, a fact that is exacerbated by water's comparative density in relation to air, which allows sound to propagate across much wider distances.

### **Contact Microphones and the Vibrating City**

In contrast to conventional microphones, contact (or piezo) microphones are ineffective as far as capturing air-borne signals; rather, they are designed to capture structure-borne sound (vibrations transmitted through solid objects that would otherwise be inaudible). Through their use, architectural and natural structures that are conventionally regarded as static and mute can be heard to hum, oscillate, pulse and warp due to various unseen internal or external mechanisms, both natural and anthropic (see Stephen Vitiello's exploration of New York's World Trade Centre via contact microphones). Sonic material obtained via the use of contact microphones in the project allowed for an observation of the infrastructural systems that permeate our built environment, exposing the ubiquity of climate control systems, transport networks and other man-made vibratory elements that are integral to the functioning of our quotidian lives. In some cases – when affixed to large metal surfaces, for example – even electromagnetic radio transmissions (a spectrum of sound that Douglas Kahn

describes as the ‘aelectrosonic’, which is discussed in greater detail below) were unexpectedly observed, further demonstrating the vibratory pervasiveness of the large-scale systems – echoes of the ‘technological sublime’ – that infuse our environment.

Vibration is, as mentioned previously in this paper, the most fundamental characteristic of sound; some of the most prominent theorists in sound studies – including Steven Goodman (2009), Marcus Boon (2012) and Julian Henriques (2011), among others – argue that affective qualities of sound are intrinsically connected to its manifestation as such a vibratory and *embodied* – rather than purely aural – mechanism. Goodman, in particular, contends that audible sound is only one particular vibratory mode of perception along a sonic continuum; the ontology of vibrational force “delves below a philosophy of sound and the physics of acoustics toward the basic processes of entities affecting other entities” (Goodman 82). Within this system, vibration – in the broad sense of both its acoustic and affective nature – becomes central to notions of power. Goodman indicates that the diffusion of significant vibratory energy requires an access to mechanisms and sites of dissemination that are available to only a select few; correspondingly, the deployment of vibrational power emerges as a key mode of control, as exemplified in situations as diverse as the DJ’s use of powerful sound systems to manipulate crowd response (“Drop the bass!”) and the military’s use of the LRAD (Long Range Acoustic Device) to control demonstrators during recent G20 protests. Though not as overtly provocative in their origins, the

vibrations captured via contact microphones for use within the remit of my thesis project did indicate that there seems to exist a monopoly of institutional control over the tactile spectrum, since virtually all of the captured artificially-generated vibrations were the product of large-scale infrastructural systems.

In contrast with Goodman's approach, which has strong political undertones, acoustemologist Steven Feld describes the tactile aspects of sound (and space) in more subjective, sensorial terms, seeing them as eliciting a particularly intense coordination of bodily responses, engaging "brain, nervous system, head, ear, chest muscles, respiration and breathing" (97). Feld stresses the reverberant, vibratory experience of embodied sound, likening it to a "physical and emotional presence" (97). Such physiological and psychological effects of frequency and infrasound in particular (frequencies below the threshold of hearing of 20Hz, or vibrations per second – sound that is felt rather than heard) have been well documented as being particularly intense; reactions include the experiencing of chills and extreme sorrow and fear (O'Keefe and Angliss 2004) as well as a feeling of "being watched" by "unseen presences in the room" (Tandy and Lawrence 4). The audio for *Transmissions From the Technological Sublime* correspondingly makes significant use of infrasonic frequencies in order to evoke such an uncanny vibratory (and therefore embodied and affective) response.



## **Induction Microphones and the Exploration of the Aelectrosonic**

Induction microphones are transducers that allow the acquisition of the 'aelectrosonic' – vibration propagated within the electro-magnetic spectrum, most notably discussed in Douglas Kahn's *Earth Sounds, Earth Signals* (2014).

Although such transmissions can be of natural origin, a large portion is the result of man-made systems – the invisible radiance of our ubiquitous electrical, transportation, communication and data networks. Urban centres are heavily saturated with these frequencies, an unheard yet intrinsic vibrational component of the contemporary environment. Furthermore, it is a spectrum of transmission that tends to remain perpetually 'on', displaying few variations in terms of diurnal or seasonal cycles. The capture of electromagnetic emanations reveals significant, often critical aspects of the urban infrastructure that remain unseen. In describing German sound artist Christina Kubisch's exploration of the electromagnetic, Salomé Voegelin argues that the aelectrosonic makes "audible the unheard vibrations of the city, which are beyond our frequency reach and yet are so important in our understanding of where we live and how we live there...rendering inaccessible, impossible slices of the invisible, the unseen mobility of a place" (*Sonic Possible Worlds* 159). Furthermore, she suggests that the transduction of these emanations to the audible range can even be regarded as a political gesture, "revealing the invisible dynamic that facilitates and determines our movements on the visible surface of the world...not only suspending our habits of thinking about what we know to be there, but opening

us to what before we did not know was there; to reconsider what is there and to imagine what else might be there also” (*Sonic Possible Worlds* 160). This notion of ‘revealing an invisible dynamic’ – particularly in cases in which such a dynamic is institutionally generated, as is the case with the electromagnetic spectrum – is one that currently carries a distinct resonance, particularly given the recent disclosure of vast, globalized corporate and governmental hidden agendas (Snowden’s uncovering of the machinations of the NSA standing as one example among many).

### **3. THE TECHNOLOGICAL SUBLIME**

As described above, my field recording-based work has engendered a strong awareness of how saturated our acoustic environment has become with the din of all-pervasive, large-scale systems – the economically-directed communications, data, distribution and transportation networks, which all emit their own spectra of vibration, oscillation and rhythm. The sonic emanations of this vast, all-encompassing, yet abstracted globalized network are, in fact, evocative of the *technological sublime*, an omnipresent background vibration to which the typical listener remains largely desensitized, a circumstance that elicits wonder while simultaneously emanating a muted terror.

The following section provides a brief history of the sublime, describing its origins as a response to the aesthetic impact of natural phenomena and tracing its present-day incarnation as the technological sublime to the immensely complex, globalized and fabricated environment that revealed itself within the field recordings. Following this historical summary, I will go on to describe how my recognition of the technological sublime in the recordings shaped both the selection and processing of the specific sounds used within the scope of this project. Finally, I will lay out how an extrapolation of the theme of the sublime progressed from the sonic into the visual, outlining specific strategies that inform the images used in the final piece.

### 3.1 A SHORT HISTORY OF THE SUBLIME

The oldest surviving essay relating to the concept of the sublime is dated from the 1st or 3rd century CE and is most commonly attributed – though not without some controversy – to Longinus. The text’s central premise is that the sublime must address monumental, powerful subjects and be associated with strong emotions. Focusing on man’s position vis-a-vis a prodigious, divinely-wrought landscape, the author suggests that nature “has implanted in our souls an unconquerable passion for all that is great and for all that is more divine than ourselves” (Longinus 146). From the Baroque period onward to Romanticism, this notion of the sublime grew to become the central aesthetic concept – one that was intrinsically linked with the sensation of awe evoked by nature. This trope of the natural sublime – found in experiences of landscape, in particular – had a great influence on my early work as a visual artist, most notably as a painter and photographer. It is also arguably a trope that has played a significant role in shaping the Canadian identity within the visual arts in general, whether in the work of the Group of Seven or in more recent paintings by artists such as Alex Colville and Christopher Pratt, painters whose quasi-cinematic mise-en-scènes have exerted a strong influence on my past visual work as well as my approach to 3D animation within the scope of this thesis.

The early stages of the Industrial Revolution coincided with a shift in the aesthetic apprehension of the sublime – a sinister aspect began to insinuate itself as it gradually distanced itself from the divine. In *A Philosophical Inquiry into the Origin of Our Ideas of the Sublime and Beautiful* (1756), Edmund Burke defines the sublime as a “delightful terror” (101-102). Immanuel Kant, on the other hand, describes the sublime in terms of a “negative lust” (89) – an ambiguous intermingling of attraction and repulsion, awe and fear, which he ascribes to the realization that the overwhelming forces of nature possess a formidable destructive capacity that ultimately serve as a reminder of our own insignificance.

The increasing technologization that characterized the nineteenth and twentieth centuries continued to create a corresponding shift in man’s relation to nature. Nature was coming to be seen as a site within which we were unwilling to acknowledge ourselves as being subjugated and overpowered; rather, it was transforming into one in which humans now imposed a technological command. In *American Technological Sublime*, David Nye (1994) describes how Americans in particular were eager to embrace this shift, transporting the sublime from geographical loci to zones of technological, mechanized power. In the words of Jos De Mul: “The admiration of the natural sublime, as it might be experienced in the Grand Canyon, for example, was replaced by the sublime of the factory, the sublime of aviation, the sublime of auto-mobility, the sublime of war machinery, and the sublime of the computer” (De Mul). However, according to Nye, the initial enthusiasm with which Americans viewed techno-scientific progress became

dampened by a growing realization that technology also operated as a force which controls and threatens; intertwined with the benefits it potentially afforded, there lurked an uncontrollable, destructive potential, one which he finds epitomized in the Janus-faced development of nuclear technology's twin manifestations in atomic energy and the atom bomb.

Living in the post-industrial 21st century, we have reached a state in which the separation of man and nature appears to have become immutable; the biotope in which we used to live has been transformed into a technotope. It is a reality that is easily detected in the field-recorded material and through the simple act of considered listening: one hears the perpetual, omnipresent din of a technologized environment – the sounds of systems without which we can no longer survive. Furthermore, these are systems that, despite their ubiquity, have concurrently become so abstracted as to echo the Baudrillardian notion of the 'hyperreal'. As Sean Cubitt puts it: "the technological determinist McLuhanism revived by Jean Baudrillard is almost an orthodoxy" (*Skins* 832). Implicit in the use of these systems is the potential for catastrophic failure (Virilio 2010, Chun 2011) – a condition whose imminence seems to constantly hover just beyond perception, a predicament that simultaneously *seduces* and *paralyzes* us. Paul Virilio's description of the post-modern response to this looming, technologized 'accident' – the catastrophe that develops implicitly as an intrinsic facet of abstracted, large-scale and uncontrollable technological change – provides an eerie parallel to both Burke's 'delightful terror' and Kant's 'negative lust':

If things operate only ‘outside of’ consciousness, the loss of consciousness of the accident, and of the major disaster, would amount not just to thoughtlessness, but to madness – the madness of voluntary blindness to the fatal consequences of our actions and inventions...It would be akin to the birth of a philanoia – literally: a love of madness. A love of radical mindlessness, in which the insane character of our acts would not only cease to worry us consciously, but would delight and captivate us (7).

In my studio work, I am seeking to counteract this “blindness” (and deafness) by placing the subjective – the body – in a more direct, sensual relation to the technological sublime both visually, and, more importantly, sonically. I am attempting to isolate and emphasize the sense of awe one feels when confronted by the massive scale and impenetrability of these contemporary, economically-based systems and networks within which we are intrinsically and inseparably entwined. I am also looking to unravel personal and emotional resonances that are routinely subsumed but nonetheless implicit in the contemporary landscape of neoliberal economics, a technocratic consumerism that refuses to engage with the implications of globalization.

Whether sonically charting the technological sublime via an examination of the urban edgelands or through the documentation of the soundscape of Canada’s financial nexus, the field recordings for my thesis project, then, reflect a sharp awareness of how sound functions as an embodied territorializing agent that “teaches us to belong, to find place, as well as how not to belong, to drift... while connecting to the dynamics of mediation, displacement, and virtuality” (Labelle xvii). Given that sound territorializes through volume, repetition and frequency – all

nodes in which institutional dominance over the methods, legalities and technologies of propagation reigns supreme – an individual's (and a field recordist's) *sole* response to such a dynamic, then, appears to lie in their ability to establish their own position within these acoustic nodes – or make their own noise.

In visually evoking the technological sublime in my work, I am particularly interested in its simultaneous and paradoxical conjuration of both transcendence and catastrophic failure. While encompassing our romantic ideal of the natural landscape/soundscape, a 'traditional' sublime which still persists, my work seeks to expose how this *natural* sublime has come to be surreptitiously displaced by the subjugation of nature by man, ultimately manifested in the urban conurbations, war machines and vast systems of production and communication that both seduce and terrify us.

### 3.2 SELECTION PROCESS – SOUNDING THE SUBLIME

Sound is a tantalizing phenomenon that simultaneously discloses and hides a great deal about its origins. Sound is the perfect sign for artists but a maddeningly imprecise one for logicians; it points without confirming and suggests without asserting.

– Joanna Demers, *Listening Through the Noise*, 115

Although the analysis of the field recordings was a key process in identifying the acoustemological characteristics of the contemporary lived environment – the soundscape of the technological sublime, in other words – that is not to say that all of the recorded sounds are audibly manifested within the final piece. This



section outlines the aesthetic rationale underlying the choice of sounds used in the final audio-visual project. For creative reasons and in order to maintain conceptual clarity and consistency with the visual elements, I made the decision to focus primarily on three types of sounds:

1) The sound of 'empty space' – a secondary anthrophony, that is, the sound of man-made environments that are devoid of a direct human presence as captured via conventional and contact microphones.

2) Sounds at frequencies occurring within the electromagnetic spectrum.

3) Anamnestic sounds

### 3.2.1 THE SOUND OF EMPTY SPACE

The sonic and vibrational ambiances of urban, suburban and exurban spaces tend to be characterized by omnipresent background drones, often containing a significant low frequency component. These are directly symptomatic of our technologized environment, the unrelenting vibrational radiance of electrical or mechanical devices. Spectrographic analysis reveals that these artificial sounds often reach into the ultra and infrasonic range – inaudible, but nonetheless embodied. In fact, even when recording in remote wilderness areas, it is extremely difficult to obtain air-transmitted sounds that are completely devoid of this anthrophonic hum; distant airplanes, highways and trains almost inevitably insinuate themselves into the soundscape. In some cases, recordings in which anthropic sounds appear inaudible reveal the telltale harmonic traces of artificial

sound upon examination of their spectrograms (see fig.7). Although acoustic ecologists such as Schafer and Krause tend to view such ‘noises’ as contaminating elements intruding within a (more desirable) ‘pure’ soundscape, it can be argued that, particularly when decontextualized (considered as ‘sound matter’ in a Schaefferian mode of ‘reduced listening’<sup>1</sup> or, somewhat ironically, apprehended ‘schizophonically’<sup>2</sup> in the Schaferian sense), these sounds can be perceived as beautiful. They tend to be rich in harmonic content, particularly when modulated by mediating spatial elements such as humidity, wind as well as architectural elements and materials. The intermixing of these frequencies – via spatial displacement or volume changes, for example – can result in complex and evolving harmonic meshes which often sound like musical chords, a euphonic symbiosis between the manufactured and natural environments. Most importantly, such an aesthetic apprehension of the territorialized soundscape can be regarded as a subjective *détournement* of the unidirectional vectors of institutionalized noise, a transduction of the institutionally-broadcast vibratory spectrum into a personal experience which is affective and perhaps even subversive.

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1. ‘Reduced Listening’ is a term coined by French composer Pierre Schaeffer; it is an approach that focuses on the characteristics of sounds in and of themselves, that is, as separate from their cause and meaning.

2: ‘Schizophonic’ sound is a concept first described by Canadian composer R. Murray Schafer; it refers to a separation from a sound’s origins within the soundscape that occurs when it is reproduced (i.e. used within a composition), and therefore decontextualized. A basic example of schizophonic sound would be the sound of a person’s voice broadcast through a speaker rather than emanating from the person themselves.

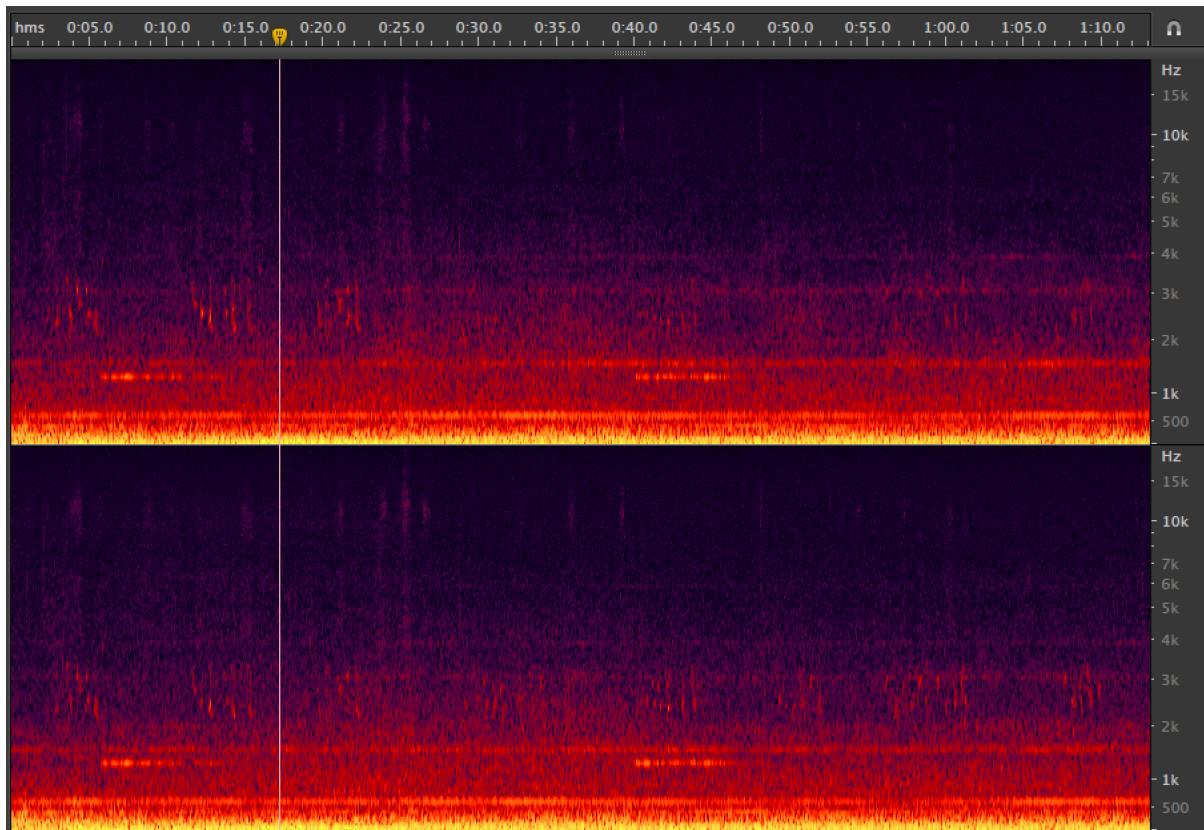


FIG 8: Spectrogram of audio recorded in Toronto's Port Lands. The bright red horizontal lines indicate the droning harmonics of the Port Lands Generating Station, approximately 1.5 km away from the recording location. The scattered bright red marks are bird calls. The thin yellow band at the bottom of the spectrogram reveals a strong infrasonic component that is largely inaudible.

### 3.2.2 ELECTROMAGNETIC SOUNDS

Proliferating as an invisible and inaudible substrate to our urban existence, electromagnetic vibrations are the radiance of the technotope upon which we depend for our survival. Moving beyond a political evaluation of the electromagnetic (as discussed earlier in this paper) to a more qualitatively-based appraisal, it is important to note that these spectra tend to exist as harmonically simple waves (see fig.8), once again inter-modulating in accordance with the subject's displacement through space. For this reason, effects such as standing

waves – in which the sound’s harmonic characteristics are modulated through the listener’s movement – can be achieved, rendering the dissemination of such sonic matter in certain spaces quasi-sculptural. Sections of my final installation piece employ this effect; disseminating such frequencies via a multi-channel speaker array creates nodes of interference wherein the overlapping sound waves can both augment or cancel one-another, depending on spatial shifts within the gallery space.

At this stage, I would like to point out that the aforementioned two categories of sounds – the anthrophony of infrastructure and industry broadcast through atmosphere/material as well as those disseminated via the magnetic spectrum – can be regarded as the true ‘voices’ of our manufactured environment; their propagation is unceasing and occurs largely autonomously. Furthermore, they are temporally omnipresent and territorially ubiquitous, rendering socio-economic and cultural demarcations permeable while paradoxically co-existing as vibrational embodied experience.

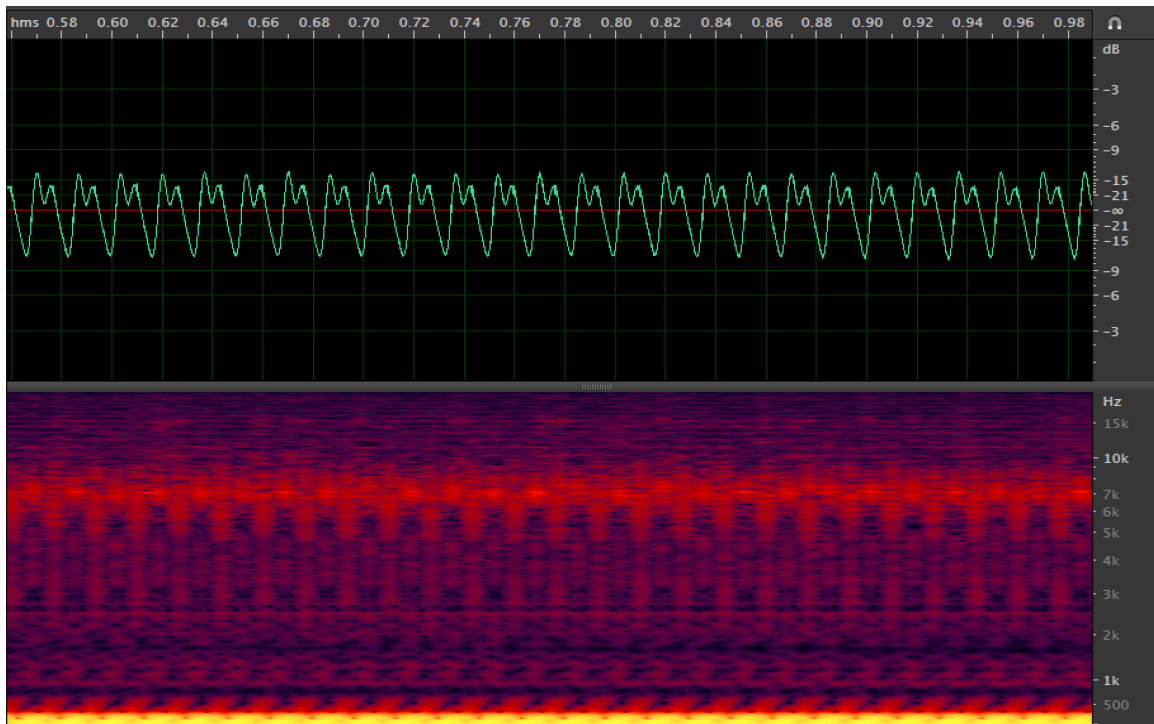


FIG 9: Waveform display (top) and spectrogram (bottom) of an induction microphone recording sourced from Toronto's PATH network.

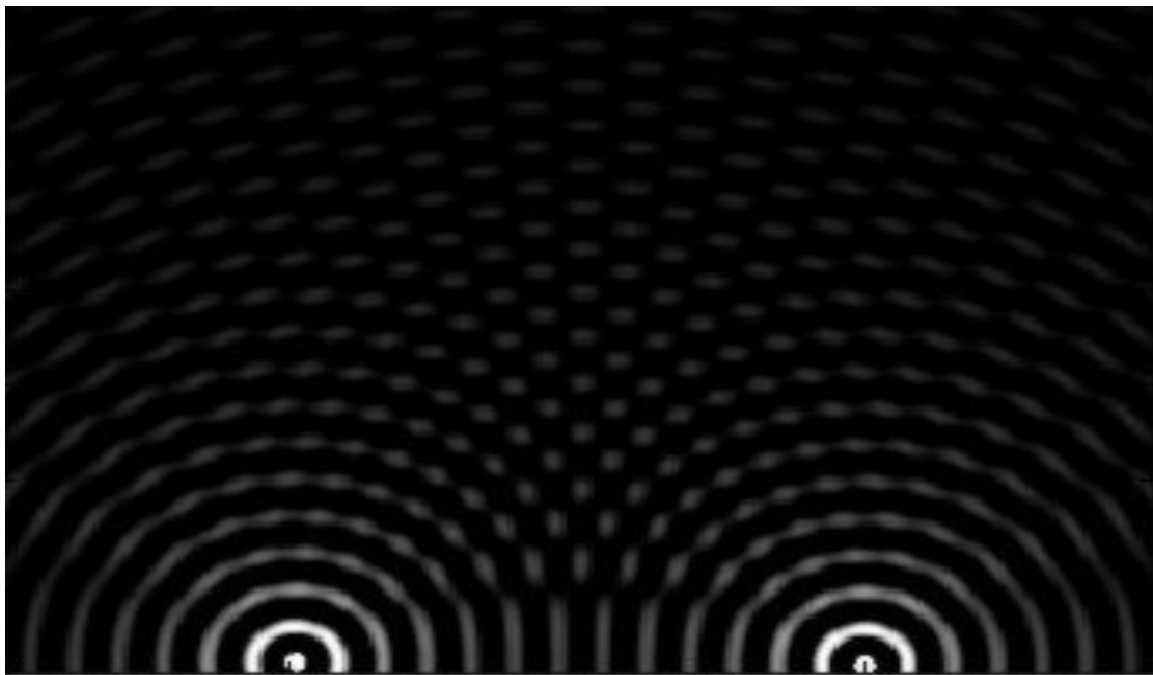


FIG 10: Illustration depicting a standing wave interference pattern from two point sources. Nodes of interference (phase cancellation) are the dark areas.

### 3.2.3 ANAMNETIC SOUNDS

The anamnetic spectrum is evidently not one that is recordable via the techniques previously described in this paper. Nonetheless, these sounds comprise a resonant stratum of the invisible and inaudible – subjective evocations contingent on a singular lived experience navigating the time-space represented in the recordings. Mostly musical, anamnetic sounds are indicative of a circumstance, condition or mnemonic association linking a particular environment with an embodied personal history. In accordance with this, notes were made during recording sessions of the earworms and sonic memories evoked by the specific locations. The related material was later sourced online, then treated and processed, a procedure which is described in the next section. Via this process, it quickly became apparent that many (if not most) of my own cases of anamnesis involve pop songs, lingering acoustic shadows of overheard melodies or ingrained refrains embedded through repetition that are rarely, if ever, auditioned deliberately. Within a broader socio-economic context, such sounds can often be regarded as the after-effects of branding's psycho-acoustic territorialization – a “mode of audition within a broader operative logic of power” (Goodman 143), or the echoes of “a sonic architecture...[an] environment of ubiquitous audition in which consumption is now routinely submerged” (Goodman 145). Shelley Trower sees the ‘internal energies’ of anamnesis as a form of vibration in and of itself, an essential linking mechanism between internal and external realms: “corresponding intensities of sense experience, quantifying the

connection between the world outside and the interior mechanics of the body and mind...Vibrations within the body – the life of the bounded organism – seem thus to become part of the external world” (38). The anamnetic, then, comprises a vital, integral aspect of the soundscape, a pervasive yet idiosyncratic overlay of resonantly mute non-sounding sound – an internalized echo of the transmissions emanating from the neo-liberal culture industry.

### 3.3 SPECTRAL MANIPULATION AND CONVOLUTION

Although the untreated field recordings possessed a sonic richness in their raw state, for conceptual purposes many of the sounds were processed using a spectral convolution process. Convolution involves a multiplication of the sonic spectra in the frequency domain using a process known as Fast Fourier Transform (FFT); this results in the amplification of frequencies that are present in both signals along with a corresponding reduction in volume of frequencies that are weak in either input signal. This process is used for two main purposes:

1. It enables the meshing of multiple recordings of the same or similar spaces.

Spectral convolution is a process used in some digital audio software applications to create artificial reverberation, or synthesized recreations of space. It does so by modeling the acoustic characteristics of ‘real’ spaces – Carnegie Hall or Saint James Cathedral, for example – in order that they may be applied to outside audio signals in order to emulate their sounding within these specific

locations. In the case of this project's audio, the process has similarly been deployed to layer different strata of experience, meshing temporally and geographically disparate acoustic spaces, in effect 'sounding' them within each other. Doing so can be seen as an attempt to re-synthesize sonic memory, an emulation of the mnemonic's blurring and re-combinatory effect on lived experience – a key element of my approach to the visuals, which is described later in this paper.

2. Spectral convolution enables the layered combination of anamnetic and dynamically propagated sounds. Sections of relevant musical works – earworms, mostly – were cross-processed with specific field recordings in accordance with mnemonic associations derived from the *dérives* (as noted via the 'LD Log' app). The redeployment and reconfiguration of such sounds via spectral processing can be interpreted as constituting a type of re-territorializing resistance or, as Goodman describes it, a 'counter-Muzak' (Goodman 142). In addition, as the images used in the project are combinatory – that is, amalgams of animated memories and photographic documentation, as well as depictions of mediated and imagined experiences – spectral processing effectively enables a parallel layering of mutually affective layers of both real and imagined acoustic time-space. It is also important to note that from an aesthetic standpoint, the sonic effect created when two audio files are spectrally convolved is that of a distanced, layered, polytextural sonic stage, one that parallels and accentuates the deep horizons of the images used within the final work.



#### **4. ANIMATING THE TECHNOLOGICAL SUBLIME**

We are in fact waiting for something, in enormous expectation of something, and present horror films are not just the formulaic products of Hollywood cinema and the desire systematically to frighten viewers, as though there were a Hell at the heart of the world. No – what we are seeing here is the recent emergence of a *sense of the End of the world* – in no sense an apocalyptic or millenarian End, synonymous with an End of History, but, more simply, an *End of Geography*, as though the all-too-famous consumer society had ended up consuming planetary space-time, a role which has been duly replaced by the recently developed communication-based society.

- Paul Virilio, *Unknown Quantity*, 109

In this section, I describe the concept of ‘animation’ in terms of both its deployment as a specific visual technique as well as in its broader definition of bringing something to life within a certain ecology, echoing Sean Cubitt. I will begin by describing specific visual strategies that inform my thesis project, then go on to outline the presentation techniques that underlie its iteration within the context of the technological sublime.

Although I have arrived at the recognition and application of the label ‘technological sublime’ via the sonic, it was with some excitement that I recognized that this notion of the sublime has in fact been an omnipresent force throughout my artistic career, the evolution of my personal fascination in many ways paralleling the historical evolution of the concept of the sublime from an engagement with the natural to the technological. As such, my thesis project completes a circle of work that encompasses my painting and early videography, most of which examined the affective experiences of solitary figures within both natural and constructed landscapes. It also builds on my work as a live

performer, which, among other things, sought to integrate animated images of data streams as well as video documentation of the edgelands that surround our urban centres with improvised electro-acoustic sound. Finally, it consolidates elements developed within the audio-visual documentary work I have undertaken in the last four years, most notably during my first term as a masters candidate at OCAD University, extrapolating the investigation-based sonic and visual elements initially explored therein into a fictional, textural narrative form.

The circular expansion of my audio work into the realm of the visual is a testament to the fact that experience is pan-sensory. It comprises, to borrow words from Steven Feld, a “reevaluation of all the senses from the standpoint of their interplay” (96), and seeks to extrapolate the broad and immersive sonic depth of field found within both the raw and the processed field recordings into the domain of the moving image. The following section will describe the manifestation of a personal, subjective response to our post-modern condition via a fictional, animated and recursive audio-visual narrative.

#### 4.1 ARTICULATING PRESENCE AND MEMORY

My previous audio-visual works were conceived as documentaries; they sought to question the place of the subjective individual within the larger socio-economic frameworks – those implicit in the ‘technological sublime’ – by situating themselves in the genre of ‘sensory ethnography’. *The Hours of Peace* examined the complex cultural, economic and social networks underlying a seemingly

inconsequential, remote and abandoned location in rural northern Greece. *A Requiem for Alexandra Park* documented the final days of a downtown Toronto public housing project shortly before it was razed to allow the construction of an upscale condominium building. *Transmissions From the Technological Sublime* is my first attempt at a *fictional* visual narrative. The decision to use 3D animation, a process I was previously unfamiliar with, is based on a variety of factors; among these, two are of paramount importance:

1. Animation allows for a layering of memory that is not necessarily restricted by concerns regarding realism, enabling the representations of memories (and therefore subjectively filtered images) to be creatively juxtaposed with resonant visual material culled from photographic and video documentation collected during the sound walks. As such, a more malleable and subjective deployment of images than that afforded by a strictly documentary visual approach is made possible. Furthermore, this constitutes a form of mnemonic layering that parallels the techniques used in the project's audio, specifically that of spectral convolution described above.

2. The use of animation facilitates the creation of a reductive visual environment and the placement of emphasis on the sonic aspects of the piece.

## 4.2 IMAGES AND IMAGINATION

[It was like] wandering through an image from my childhood.

- Chris Marker, *Making Images Move*, 28

Cinematic essayist Chris Marker – a film-maker whose influence bears a strong imprint on my video work – describes the moment when he found himself in an area of Beijing (then still known as ‘Peking’), a city he had previously only seen portrayed in a childhood book, in terms of a drift: a wandering through the memory of his childhood. In many respects, this statement encapsulates my own personal response to discovering the possibilities afforded by the use of 3D animation. Powerful, evocative images from my early years could be resuscitated and recombined with the descendant fascinations of a more mature self, effectively exposing the fact that my interest in large-scale mechanisms, systems and networks has proven to be a lifelong preoccupation. In particular, vivid memories of childhood trips taken in the company of my grandfather resurfaced in my consciousness – recollections of enchanted afternoons spent in a parked car watching and listening to airplanes taking off at Montréal’s Dorval airport, being one particularly resonant example. These afternoons were accompanied by a narration of the technical characteristics of the airplanes as well as tales of the destinations implied in their liveries (the names Aer Lingus, Alitalia, Lufthansa, etc. still hold a romantic resonance to this day, this despite my vivid awareness of the tedium of air travel). The context for these trips was the early to

mid 1970s; despite being very young, I was nonetheless aware that this was an era in which air travel was also becoming a widely-mediated site for both real and fictional disaster. The exoticized romance of long-distance travel was becoming tempered by the growing threat of hijackings and catastrophic failure – an early awakening of the pervertedly ‘delightful terrors’ implicit in systems whose scale already surpassed my ability to subjectively apprehend them. Although these journeys to the airport were the most memorable, shipping channels, industrial regions of Montréal’s urban conurbation and darkened night-time highways bordered by massive glowing billboards also feature prominently in my memories of these peripatetic road trips. These are, in fact, images that reappear as common tropes throughout my work as a visual artist, which has often focused on the liminal areas between the natural and the man-made. In a significant way, then, the animation process consisted of an exploration of my own past, one interspersed with sudden mnemonic triggers and the discovery of latent, unexpected correspondences. Animator and theorist Tom Sherman describes the effect succinctly, stating:

Animation is the hard copy of memory, accessed while it is being rendered by hand, or by hands assisted by the machine. In general terms, animation is memory that moves and evolves...When I state that animation is the ‘concrete, explicit articulation of imagination,’ I am taking a shortcut toward creating meaning. I am saying that animation – memory in the act of forming – alludes to something essential, yet unattainable: the imagination itself...Animation is the transparent act of manufacturing memory (194).

The mechanized protagonist in ‘Transmissions from the Technological Sublime’ – the invisible individual in a car – evolved as a combinatory avatar of me, my

grandfather and a generalized 'everyman'. I use the gendered term 'everyman' here deliberately, for it must be a man: he is in a man's car (a black sedan – a Ford Crown Victoria, to be exact, a model commonly used by taxi drivers and the police) and this alter ego is seen to be seduced by what are traditionally regarded as masculine tropes of power, whether it be the military or the brute force of mechanized technology. There is an analogous fetishization of scale, which is manifested in the massive size of the technological apparatuses or the deep horizons of the landscape that appear to be the focus of the protagonist's quest. This journey, however, is a solitary one whose purpose is unclear: is he searching for or running away from? Either way, the act is paradoxical, for he remains encased in his machine, isolated from the sonic – perhaps the sole/soul of what he seeks – in an endless, looping *dérive*. The parallels between the animated protagonist's journey and my own urban wanderings find a direct correspondence in the recursive, solitary nature of this quest. There is a blurring of internal and external affect – a sublime mixture of pleasure, boredom, heightened awareness and anxiety – which offers no resolution and no indication that that which is being heard and observed is in any way going to be acted upon. There exists, then, an absence of human agency in the face of these unfathomable forces; relocation – a movement in which there is little or no distinction between *away from* and *towards* – manifests itself as the only option within a circular system of entrapment. It is this anaesthetizing quality of the technological sublime that comprises its most terrifying aspect – awareness of its

machinations and ramifications does not imply an ability to respond. Paul Virilio describes this paralyzed state thus:

This mute cry of the host of the absent, present at the same moment in front of their screens and contemplating the disaster in a state of stupefaction, is not without its consequences...It is no longer so much the *event* as the *anaesthesia* making it [the accident] possible and bearable which provides us with explanations (45).

In her essay 'Video Games and the Technological Sublime', Eugénie Schinkle sees a similar numbness arising from a pervasive use of video games. She describes a state which she terms 'stuplimity' – a combination of sublime affect and stupefaction that "draws together boredom and astonishment, it fuses awe to its opposite and holds these opposing affects in tension – an indefinite state without resolution"(Schinkle).

In many respects Schinkle's description bears a direct relation to the plight of the mechanized protagonist caught in a perpetual loop within the empty sets depicted in *Transmissions from the Technological Sublime*. It is perhaps apt, then, that the models used to create the animations for the piece are mostly appropriated from video games, that is, downloaded from various websites that offer royalty-free 3D models intended for use in commercial applications. In most cases the models were 'modded' – modified in order to better represent the images as subjectively remembered and/or imagined. All visual elements are synthetic; whatever is left of the natural world is communicated sonically. No humans are visible; they are trapped within their machines, their only traces manifested via images on roadside billboards and the relics of what they manufacture or consume: the flickering televisions and emptied pop cans

produced by a mediated, commodified society. Even the camera movements are evidently synthesized, a programmed, impossibly static (evoking surveillance) or unnaturally smooth flow that is intentionally devoid of any remnant of a Benjaminian 'aura'. As Laura U. Marks states in her appraisal of the work of the Brothers Quay: "As we begin to perceive the annihilating capacity of the simulacra image in a world whose objects are increasingly produced by mechanical reproduction, there seems to be a new urgency to rediscover aura" (135). It is my hope that this aura remains in the *sonic*: the embodied, vibratory interfacing of external/internal spaces and histories commingling in a resonant, transitory moment.

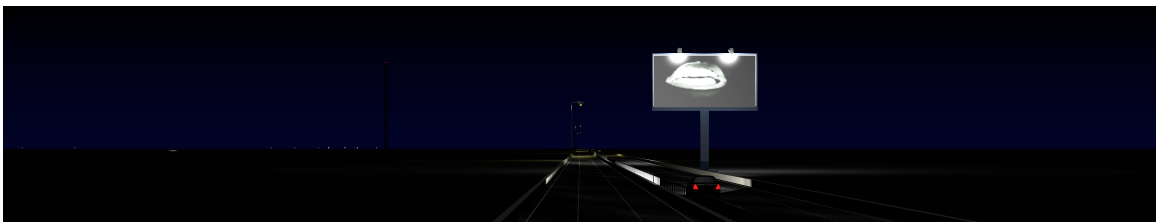


FIG 11: *Transmissions from the Technological Sublime*, Animation still

### 4.3 ANIMATION STRATEGIES

Three animation strategies have been used in order to facilitate such a re-centering based on the acoustic:

The first strategy relates to the way in which the narrative unfolds in a landscape that lies in a perpetual penumbra. Richard Rath and Steven Feld see



an increased attention upon the sonic as a result of living in environments in which the visual field is similarly obscured or closely constricted. Feld's analysis of the Bosavi people's sense of place, for example, sees the short sight-lines of their jungle environment as a significant factor underlying the fact that they "hear, respond to and imagine places as sensually sonic" (96). Psychologist Ernst Jentsch similarly interprets darkness (a shortcoming of vision, much like the short sight-lines of the Bosavi) in terms of a condition that retains the capacity to evoke a state of "psychical uncertainty" (7) – the other senses become heightened as a response to the inability of knowing what to expect.

The second strategy allows the scenes to unfold in a durational manner, largely avoiding the use of sudden cuts or dramatic perspectival shifts. The gaze is intended to be meditative: the viewer is left mostly still, encouraged to immerse themselves in a cinematic space that is sparse in terms of imagery, yet acoustically dense, vibratory and evolving. Filmmaker Peter Hutton, who is known for his use of extended, fixed camera shots, describes a more contemplative way of looking: "the more time you spend actually looking at things, the more they reveal themselves in ways that you don't expect" (qtd. in MacDonald, "The Garden in the Machine" 243). In keeping with the acoustemological approach to ethnography espoused by Steven Feld, I contend that the act of listening can be substituted for that of looking within the context of Hutton's statement, arguing that there exists a wealth of information within the heard – that is, a "potential of acoustic knowing, of sounding as a condition of

and for knowing” (Feld 97) which tends to become amplified via the act of extended listening.

The third strategy involves the use of an exaggerated panoramic aspect ratio in order to privilege the presentation of space itself rather than to draw attention to specific nodes of narrative activity. The unusual perspective is also meant to reference, in an augmented fashion, pictorial traditions of landscape, which are as film scholar Scott MacDonald indicates, “widely understood as a form of resistance to many forms of industrial development” (*The Garden in the Machine*, 41). As such, the wide, horizontal arrangement accentuates the contrast between the land itself and the elements that mark a human incursion upon its space – in many cases, contrasting vertical elements such as transmission towers or telephone poles.

#### 4.4 EXHIBITION STRATEGIES

The visuals for *Transmissions From the Technological Sublime* are conceived to be displayed as a large-scale, panoramic, triple-screen HD projection; for this reason, the master files are rendered at a resolution of 5760 x 1080 dpi, though the final output is scalable. Such high-resolution animated graphics tend to possess a hyper-real quality that lends itself well to a fictional portrayal of a hyper-technologized sublime. Katie Morgan describes the effect created by high-definition 3D animation as causing viewers to “feel unnerved by the ultra realism

within the animation, edging towards the perverse feeling of the ‘uncanny valley’” (Morgan). Notably, this is a response that (once again) echoes the ‘delightful terror’ Burke recognized in the sublime.

Audio is mixed to seven discrete channels: six ‘conventional’ speaker channels – which are disseminated in an equidistant hexagonal array – and one low frequency/infrasonic channel, disseminated via a subwoofer. The use of such an arrangement allows for an accentuated and mobile spatialization of sounds, permitting the recreation of a wide, liquid sonic depth of field that encompasses sounds happening not only in front of, but also around and behind the viewer. For these reasons, sound is experienced with a depth and breadth of field that replicates a ‘real’ listening situation, as opposed to a more conventional left/right stereo arrangement. Finally, the integration of a low-frequency, tactile infrasonic element enables a corresponding capacity for psychological and physiological affect, a phenomenon also previously described in this paper.

Logistical and financial considerations did, however, bear an impact on the piece’s presentation within the context of my thesis exhibition. Although the audio dissemination portion of the project remains unchanged, the video component is broadcast in a single-channel HD format. Though technically possible, a three-channel video stream is impractically complex within the remit of this project – particularly given its articulation within a relatively small space – as it requires the synchronization of multiple computers and projectors. Tests that attempted to do so via a specially programmed MAX/MSP patch were successful, though

enormously taxing on even a late-model machine's processing capabilities. It is unlikely that such a arrangement could have run over the course of a one-week exhibition period without seriously compromising the computer's processor.

## **PART 5: SUMMARY, IMPLICATIONS, AND AVENUES FOR FURTHER RESEARCH**

The intent of this project was to focus on a more considered approach to contemplating our lived environment: first of all, to *listen to* rather than simply *hear*, and, as a secondary concern, to *look at* rather than merely *see*. In a consumer society in which the visual has come to be the main mode of seduction, an emphasis on the other senses provides both an avenue for a détournement of the vision-centred methods of transmission and a capacity for an expanded sensory experience. This project sought such a re-structuring via the sonic; however, such a re-appraisal of our non-visual senses via a subversion of the traditional sensory hierarchy is nothing new: the ‘No Tights, No Lycra’ events in Toronto (billed as “A weekly dance jam in the dark for the joy of dancing”) as well as restaurants such as Montréal’s ‘O.Noir’ (in which clients eat meals in complete darkness) also investigate the effects (and advantages) of re-privileging the non-visual. Despite these efforts, however, the expansion of a non-visual discourse – both within the arts and society at large – still remains subsidiary and under-investigated; a continued investigation into a re-orientation of the sensory hierarchy towards the other senses would stand to benefit not only the non-seeing population, but also serve to expand the general population’s sensory loci. This can perhaps be regarded as being more relevant than ever given the manner in which our gaze is increasingly drawn to the quasi-ubiquitous yet constrained and perspectival realm of the screen – a mediatic trope in which

ever-increasing optical resolution has in fact been paralleled by a relative degradation in audio quality in daily consumption of media (as evinced in the acceptance of the compressed and low-resolution mp3 as the de facto standard digital sound format).

During the course of my research, I attempted to find other pieces that broached a similar approach to the integration of sound and image, specifically, work that engaged itself with a view to articulating a durational, textured, sensual and spatially-oriented narrative. There are certainly precedents – the experimental films of Abbas Kiarostami, Chris Marker’s cinematic essays, Doug Aitken’s and Bill Viola’s large-scale, immersive video works as well as the spectral, installation-based narratives of David Hoffos all come to mind as being highly influential. Though there are thematic commonalities between these works and *Transmissions from the Technological Sublime*, it is more apparent, however, that there are significant differences, chief among which is the fact that they tend to remain classified as visual artists. Similarly, there are many audio works that present themselves as ‘cinema for the ears’, many of which also experiment with multi-channel diffusion (Louisiana State University’s ongoing ‘Cinema for the Ears’ series is one notable example); however, these tend to position themselves as strictly audio-based works or, specifically, ‘films *without* images’.

As it stands, this project can just as easily be defined by what it *is not* as by what it *is*: it is not a musical piece, nor is it conventional cinema. It is not

something that would normally be viewed in a home environment, nor is it necessarily suited to a traditional theatre, gallery space, or music venue. Arguably, the integration of a significant visual component may suggest that it is not even sound art, not as it is usually understood, anyway, though the category's canon remains in a state of evolution.

As one would expect, the realization of this project has also conjured new questions, which warrant further creative and scholarly research:

**What kind of space lends itself to the optimal presentation of this kind of work?** The creation of an immersive space that would allow for (or, better yet, encourage) durational listening and looking is a key consideration in its dissemination; it is also a factor that I believe was not addressed to the extent it could have been within the context of my thesis exhibition. The iteration of the work as an installation proved somewhat problematic: interruptions (mostly caused by people entering and leaving the exhibition space) proved to be both visually and sonically distracting, suggesting that the presentation of the piece in a static, contemplative environment would be more effective. Cinemas, symphony halls and opera houses tend to foster such a listening/viewing environment and could be reconfigured to enable the dissemination of multichannel sound via all axes, including from above and below the auditor. It is also conceivable that a tactile component could be incorporated by means of transducers placed within the floor or seating structures. Another intriguing option

would be to revive the now-almost-defunct concept of the planetarium – Montréal's Satosphère (located at the Société des Arts Technologiques) provides an interesting and successful precedent in this regard.



FIG 12: *Transmissions from the Technological Sublime*: thesis show installation

**Can a performative element be integrated?** If so, does it need to be creator-centred or can it be audience-centred? How could a creator-centred articulation differentiate itself from the live cinema projects I have already been involved in? What would differentiate an audience-centred, interactive adaptation of the piece from a video game? Can other senses be integrated into a similar approach – a greater tactile element or an olfactory element, for example?



As it stands, I see the realization of this project as a first step towards a potentially far-reaching reconfiguration of sensory modalities. Such a re-prioritization of the senses entails a re-orientation of the subject within the external world in a manner that is both *embodied* and, perhaps most importantly, *political* in its disruption of the traditional visual vectors of institutional force.

## **BIBLIOGRAPHY**

Anderson, Isobel. "Voice, Narrative, Place: Listening to Stories": *Journal of Sonic Studies* Vol. 2 no. 1 (May 2012): n. pag. Web. Accessed May 23<sup>rd</sup>, 2014.

Ashfield, Andrew, and Peter de Bolla, eds. *The Sublime: A Reader in British Eighteenth-Century Aesthetic Theory*. Cambridge: Cambridge University Press, 1996. Print.

Attali, Jacques. *Noise: The Political Economy of Music*. Minneapolis: University of Minnesota Press, 1997. Print.

Augé, Marc. *Non-Places: Introduction to an Anthropology of Supermodernity*. London: Verso Books, 1992. Print.

Augoyard, Jean-François. *Sonic Experience: A Guide to Everyday Sounds*. Montréal: McGill-Queen's University Press, 2005. Print.

Barbash, Ilisa, and Lucien Castaing-Taylor, dir. *Sweetgrass*. Harvard Sensory Ethnography Lab, 2009. Film.

Beckman, Karen and Jean Ma, eds. *Still Moving: Between Cinema and Photography*. London: Duke University Press, 2008. Print.

Bijsterveld, Karin, ed. *Soundscapes of the Urban Past: Staged Sound as Mediated Cultural Heritage*. Bielefeld: Transcript Verlag, 2013. Print.

Boon, Marcus. "One Nation Under a Groove?: Music, Sonic Borders, and the Politics of Vibration". *Sounding Out*, Sound Studies Blog. February 4<sup>th</sup>, 2013. Web. Accessed December 23<sup>rd</sup>, 2014

Burke, E., and D. Womersley. *A Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful and Other Pre-Revolutionary Writings*. London/New York: Penguin Books, 1998. Print.

Cage, John. *Silence*. Middletown, CT; Cambridge University Press, 1939. Print.

Careri, Francesco. *Walkscapes: Walking as an Aesthetic Practice*. Barcelona: Editorial Gustavo Gili, SL., 2002. Print.

Cascone, Kim. "Transcendigital Imagination: Developing Organs of Subtle Perception", *Interference Journal*, Issue 4 (2013): n. pag. Web. Accessed June 13<sup>th</sup>, 2014.

Castaing-Taylor, Lucien, and Verena Paravel, dir. *Leviathan*, Harvard Sensory Ethnography Lab, 2013. Film.

Castells, Manuel. *The Rise of the Network Society*, 2nd ed. Oxford, U.K.: Blackwell Publishing, 2000. Print.

Chion, Michel. *Audio-Vision: Sound on Screen*. New York: Columbia University Press, 1990. Print.

----- *Film: A Sound Art*. New York: Columbia University Press, 2003. Print.

Chun, Wendy. *Programmed Visions: Software and Memory*. Cambridge: MIT Press, 2011. Print.

Corbin, Alain. *Village Bells: Sound and Meaning in the Nineteenth-Century French Countryside* (trans. Martin Thom). New York: Columbia University Press. 1998, Print.

Cubitt, Sean. *David Mabb: Skins*. Plymouth: Cornerhouse Publications, 1996. Print.

----- "Ecocritique and the Materialities of Animation", *Pervasive Animation*, p.94-114, Suzanne Buchan (Ed.), New York, Routledge, 2013. Print.

Debord, Guy. *Internationale Situationniste #2*. Paris, December 1958. Print.

Demers, Joanna. *Listening Through the Noise – The Aesthetics of Experimental Electronic Music*. New York: Oxford University Press, 2010. Print.

Eagleton, Terry. *The Ideology of the Aesthetic*. Oxford: Blackwell, 1999. Print.

Erlmann, Veit. *Reason and Resonance: A History of Modern Aurality*. Brooklyn: Zone Books, 2010. Print.

De Mul, Jos. "Essay: The Technological Sublime". *Next Nature*, n.p. July 17<sup>th</sup>, 2011. Web. Accessed November 19<sup>th</sup>, 2014.

Dyson, Frances. *Sounding New Media: Immersion and Embodiment in the Arts and Culture*. Los Angeles: University of California Press, 2009. Print.

Feld, Steven. *Waterfalls of Song: An Acoustemology of Place – Resounding in Bosavi, Papua New Guinea*. Seattle: University of Washington Press, 1996. Print.

Feld, Steven and Keith H. Basso. *Senses of Place*. Santa Fe, N.M.: School of American Research Press, 1996. Print.

Foreman, Iain. "Spectral Soundscapes: Exploring Spaces of Remembrance Through Sound". *Interference Journal*, Issue 2. (2012): n.pag. Web. Accessed June 13<sup>th</sup>, 2014.

Gandy, Matthew and BJ Nilsen, eds. *The Acoustic City*, Berlin: Jovis Verlag GmbH, 2014. Print.

Gehman, Chris and Steven Reinke, eds. *The Sharpest Point: Animation at the End of Cinema*, Toronto: YYZ Books, 2005. Print.

Gilbert-Rolfe, Jeremy. *Beauty and the Contemporary Sublime*. New York: Allworth Press. 1999. Print.

Goodman, Steven. *Sonic Warfare: Sound, Affect and the Ecology of Fear*. Cambridge: MIT Press, 2009. Print.

Helgason, Bjarni. "Sounds Abstract: Making Strange, Abstract Sound and Abstract Listening in Audio-Visual Context", *Sound Art Archive* (2006): n.p. Web. Accessed June 10<sup>th</sup>, 2014.

Henriques, Julian. *Sonic Bodies: Reggae Sound Systems, Performance, Techniques, and Ways of Knowing*. New York: Continuum, 2011. Print.

Horak, Jan Christopher. *Making images Move*, New York: Smithsonian, 1997. Print.

Jentsch, Ernst. "On the Psychology of the Uncanny", Trans. Roy Sellars. *Boundary Language*, Penn State University, n.d. Web. Accessed on January 2<sup>nd</sup>, 2015.

Kahn, Douglas. *Noise, Water, Meat: A History of Voice, Sound and Aurality in the Arts*, Cambridge: MIT Press, 2001. Print.

----- *Earth Sound, Earth Signal: Energies and Earth Magnitude in the Arts*, Berkeley: University of California Press, 2013. Print.

Kant, Immanuel. *Kritik Der Urteilskraft. Vol. X*, Frankfurt: Theorie-Werkausgabe, 1968. Print.

Keizer, Garret. *The Unwanted Sound of Everything We Want: A Book About Noise*, New York: PublicAffairs, 2010. Print.

Kelly, Caleb, ed. *Sound: Documents of Contemporary Art*. Cambridge: MIT Press, 2011. Print.

Kiarostami, Abbas, dir. *Five Dedicated to Ozu*, NHK Productions, 2009. Film.

Kim-Cohen, Seth. *In the Blink of an Ear: Toward a Non-Cochlear Sonic Art*. New York: Bloomsbury, 2009. Print.

Krause, Bernie. *Wild Soundscapes: Discovering the Voice of the Natural World*. Berkeley, California: Wilderness Press, 2002. Print.

Krause, Bernie. *The Great Animal Orchestra: Finding the Origins of Music in the World's Wild Places*. New York: Back Bay Books, 2012. Print.

Labelle, Brandon. *Acoustic Territories: Sound Culture and Everyday Life*. New York: Bloomsbury, 2010. Print.

Labelle, Brandon and Claudia Martino, eds. *Site of Sound #2: Of Architecture and the Ear*. Berlin: Errant Bodies Press, 2011. Print.

Lander, Dan and Micah Lexier, eds. *Sound by Artists*. Toronto: Charivari Press, 1990. Print.

Lane, Cathy and Angus Carlyle, eds. *In the Field: The Art of Field Recording*. Axminster: Uniformbooks, 2013. Print.

Lefebvre, Henri. *The Production of Space*. Oxford: Blackwell Publishing, 1991. Print.

----- *Rhythmanalysis: Space, Time and Everyday Life*. New York: Continuum, 2004. Print.

Longinus. *On the Sublime in Classical Literary Criticism*. Ed. T. S. Dorsch. Baltimore: Penguin Books, 1965. Print.

Longstrup, Korgh M.: "Hear (h)ere; an Acoustemological Manifesto", *Audiovisuel Kultur*, Aarhus Universitet, January 11<sup>th</sup>, 2008. Web. Accessed March 24<sup>th</sup>, 2015.

MacDonald, Scott. *A Critical Cinema 3: Interviews with Independent Filmmakers*. Berkeley: University of California Press, 1998. Print.

----- *The Garden in the Machine: A Field Guide to Independent Films about Place*. Berkeley: University of California Press, 2001. Print.

Marks, Laura U. "Institute Benjamenta: An Olfactory View". *The Sharpest Point: Animation at the End of Cinema*. Eds. Gehman, Chris and Steve Reinke. Toronto: YYZ Books, 2005. 127-135. Print.

Marx, Karl. *Capital: A Critique of Political Economy*. Moscow: Progress Publishers, 1887. Print.

McGinn, Bernard. *The Essential Writings of Christian Mysticism*. New York: Modern Library, 2006. Print.

Migone, Chris. *Sonic Somatic: Performances of the Unsound Body*. Berlin: Errant Bodies Press, 2012. Print.

Miller, Paul D., ed. *Sound Unbound: Sampling Digital Music and Culture*. Cambridge: MIT Press, 2008. Print.

Monahan, Gordon. *Seeing Sound: Sound Art, Performance and Music 1978-2011*. Berlin: Singuhr Verlag, 2011. Print.

Morgan, Katie: "So Real it's Fake: An Exploration of Realism in Animation", Division of Cultural & Creative Industries, Barking & Dagenham College, n.d. Web. Accessed February 1<sup>st</sup>, 2015.

Nye, David E. *American Technological Sublime*. Cambridge: MIT Press, 1994. Print.

O'Callaghan, Casey. *Sounds: A Philosophical Theory*. Oxford: Oxford University Press, 2007. Print.

O'Keefe, Ciaran, and Sarah Angliss. "The Subjective Effects of Infrasound in a Live Concert Setting". *CIM04: Conference on Interdisciplinary Musicology*. Graz, Germany. Graz: Graz UP, 2004. Print.

Patch, Justin. "Caught in the Current: Writing Ethnography that Listens", *Journal of Sonic Studies* Vol. 4 no. 1 (May 2013): n.p. Web. Accessed May 23<sup>rd</sup>, 2014.

Priest, eldritch. *Boring, Formless Nonsense: Experimental Music and the Aesthetics of Failure*. New York: Bloomsbury, 2013. Print.

Prochnik, George. *In Pursuit of Silence; Listening for Meaning in a World of Noise*. New York: Anchor Books, 2010. Print.

Rath, Richard Cullen. *Hearing American History*. Bloomington, IN: Journal of American History, 2008. Print.

Reinke, Steve and Tom Taylor, eds. *Lux: A Decade of Artists' Film and Video*. Toronto: YYZ Books, 2000. Print.

Rogers, Holly. *Sounding the Gallery: Video and the Rise of Art-Music*. New York: Oxford University Press, 2013. Print.

Schaeffer, Pierre. *Traité des objets musicaux*. Paris: Le Seuil, 1966. Print.

Schafer, R. Murray. *Our Sonic Environment and The Soundscape – the Tuning of the World*. Merrimac, MA: Destiny Books, 1993. Print.

Schinkle, Eugénie. "Video Games and the Technological Sublime." *Tate Papers* Issue 14. Tate Modern, October 1<sup>st</sup> 2010. Web. Accessed February 2nd., 2015.

Scrimshaw, Will. "Any Place Whatever." *Interference Journal* Issue 2 (2013): n.p. Web. Accessed August 5th, 2014.

----- "Non-Cochlear Sounds: On Affect and Exteriority." *willscrimshaw.net*. n.p. 2012. Web. Accessed July 20th, 2014.

Shank, Barry. *The Political Force of Musical Beauty*. London: Duke University Press, 2014. Print.

Shaw, Jeffrey and Peter Weibel, eds. *Future Cinema: The Cinematic Imaginary After Film*. Cambridge: MIT Press, 2003. Print.

Sherman, Tom. "Video/Intermedia/Animation." *The Sharpest Point: Animation at the End of Cinema*. Eds. Gehman, Chris and Steve Reinke. Toronto: YYZ Books, 2005. 188-197. Print.

Smalley, Dennis. "Space-form and the acousmatic image." *Organised Sound*. 12/1: 35–58. Cambridge University Press, 2007. Print.

Smith, Bruce. *The Acoustic World of Early Modern England: Attending the O-Factor*. London: University of Chicago Press, 1999. Print.

Smith, Mark M. "Producing Sense, Consuming Sense, Making Sense: Perils and Prospects for Sensory History." *Journal of Social History*. University of South Carolina (Summer 2007): 841-858. Print.

----- *Listening to Nineteenth-Century America*. Chapel Hill: University of North Carolina Press, 2001. Print.

Sterne, Jonathan. *The Audible Past: Cultural Origins of Sound Reproduction*. London: Duke University Press, 2003. Print.

Tandy, Vic and Tony R. Lawrence. "The Ghost in the Machine." *Journal of the Society for Psychical Research*. 62.851 (April 1998): 360-364. Print.

Toop, David. *Sinister Resonance: The Mediumship of the Listener*. London: Continuum, 2010. Print.

Trower, Shelley. *Senses of Vibration; A History of the Pleasure and Pain of Sound*. New York: Continuum Books, 2012. Print.

Truax, Barry. "Soundscape, Acoustic Communication and Environmental Sound Composition." *Contemporary Music Review* Vol. 15, Part 1 (1996): 49-65. Print.

----- *Acoustic Communication*, Second Edition. Westport: Ablex Publishing, 2001. Print.

----- "Convolution". Simon Fraser University. n.d. Web. Accessed January 2<sup>nd</sup>, 2015.

Virilio, Paul. *Unknown Quantity*. London: Thames & Hudson, 2003. Print.

Vitiello, Stephen. "The Sounds of the World Trade Center." *Studio 360*. Studio 360, September 2<sup>nd</sup>, 2011. Web. Accessed January 3<sup>rd</sup>, 2015.

Voegelin, Salomé. *Listening To Noise and Silence: Towards a Philosophy of Sound Art*. New York: Continuum, 2010. Print.

----- *Sonic Possible Worlds: Hearing the Continuum of Sound*, New York, Bloomsbury, 2014. Print.

----- "Collateral Damage", *The Wire* #364, June 2014: 16. Print.

Walraven, Maarten (2013): "History and its Acoustic Context: Silence, Resonance, Echo and Where to Find them in the Archive": *Journal of Sonic Studies* Vol.4 no.1 (May 2013): n.p.. Web. Accessed May 23<sup>rd</sup>, 2014.

Watson, Chris. *In St Cuthbert's Time : The Sounds of Lindisfarne and the Gospels*. London: Touch music TO:89, 2012. CD.

Wells, Paul and Johnny Hardstaff (Eds.). *Re-Imagining Animation: The Changing Face of the Moving Image*. New York: AVA Academic Press, 2008. Print.

Winderen, Jana. *Out of Range*, London: Touch Music, 2014. CD